

Get Started with Qosium

Tutorials are the best resource for getting the hang of network measurements with Qosium. These guides are designed for anyone with basic knowledge of computer networks to grasp the basic concepts and workflows of Qosium quickly.

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1. Qosium Trial Edition Install Guide

Trying out Qosium yourself gives the best guarantee that the software is suitable for your use case. This guide will walk you through the process of downloading and installing the Trial Edition of Qosium, which takes less than 15 minutes.

1.1. Create a Kaitotek Account

To download Qosium Trial Edition, you'll need to create an account on our site. Please head to [the sign-up page](#) and fill out the sign-up form. Type your email address and company name first. Then, there is a little challenge, whose purpose is to hinder bots from creating accounts. Please read carefully the instructions and then answer the question below.

Sign Up for Free Trial

Register an account for downloading and testing Qosium Trial Edition.

Please fill in the fields below to sign up. After filling out the form, you will receive an email with instructions on how to proceed with downloading Qosium Trial Edition.

Please notice that Qosium Trial Edition contains tools only for **manual measurements**. If you are interested in automatic monitoring, please contact [Kaitotek support](#) directly.

[Having trouble signing up? See our guide for help.](#)

Email address *

first.last@mycompany.com

Organization name *

My Company Ltd.

Verification *

To prevent system misuse, let's make a simple check. Please read the following question carefully and answer in the field below.

Calculate all the instances of the letter u in the headline of this form. Add that to the number you get from the box below. Read the instructions on the cover of the box.

To open, bring the mouse cursor over me.
Look inside and take the blue number.

What is the number you get?

|

Submit

← Back

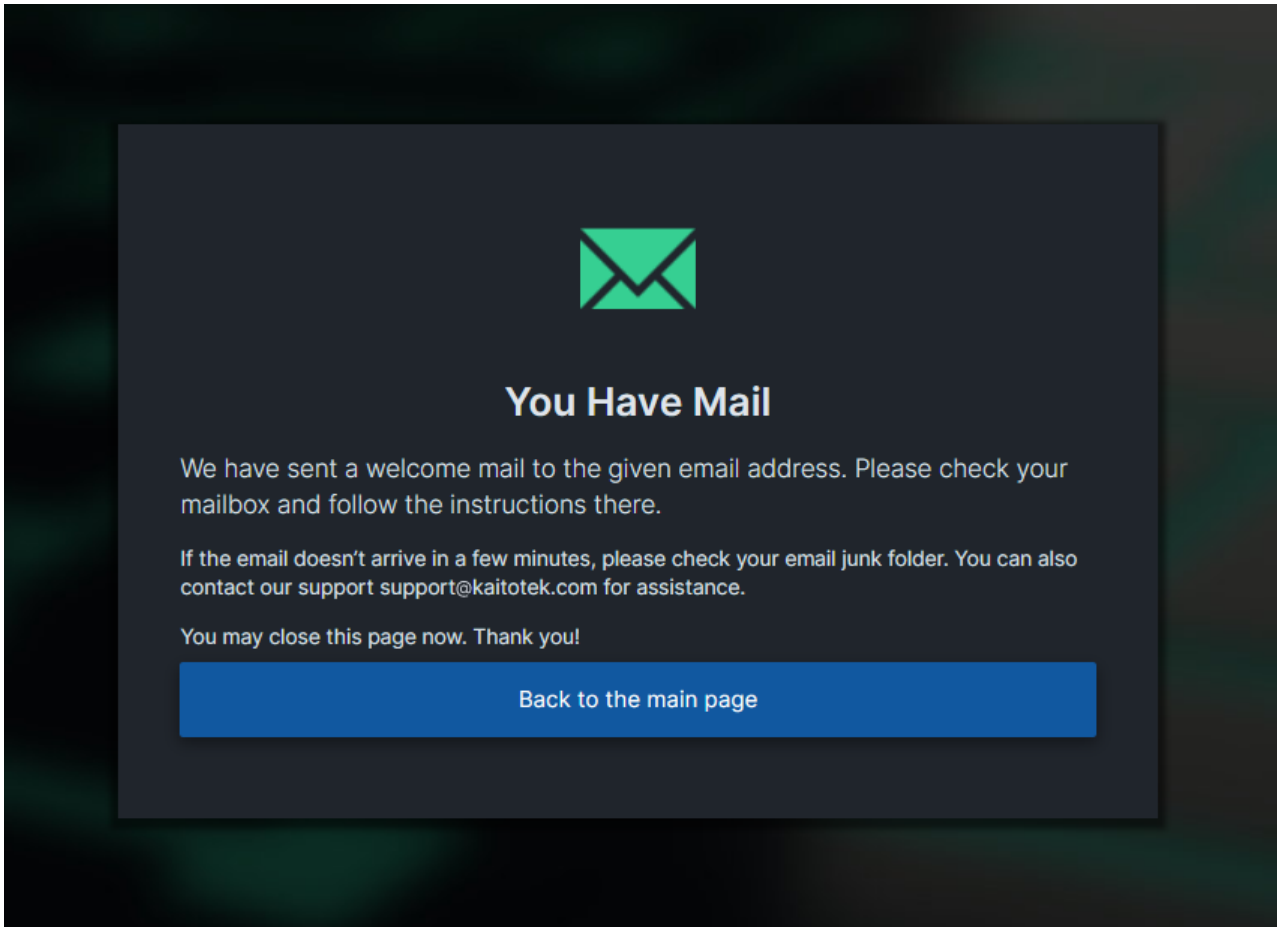
We handle your data with care. Please take a few moments to read our [privacy policy](#). Any information sent via forms is subject to the privacy policy.



If you do not wish to disclose the company you are working for, type "Private". You'll need to input a valid email address, but you may also use an off-work email address, such as your personal Gmail.

After filling out the fields, press **Submit**. A following confirmation window appears if everything went

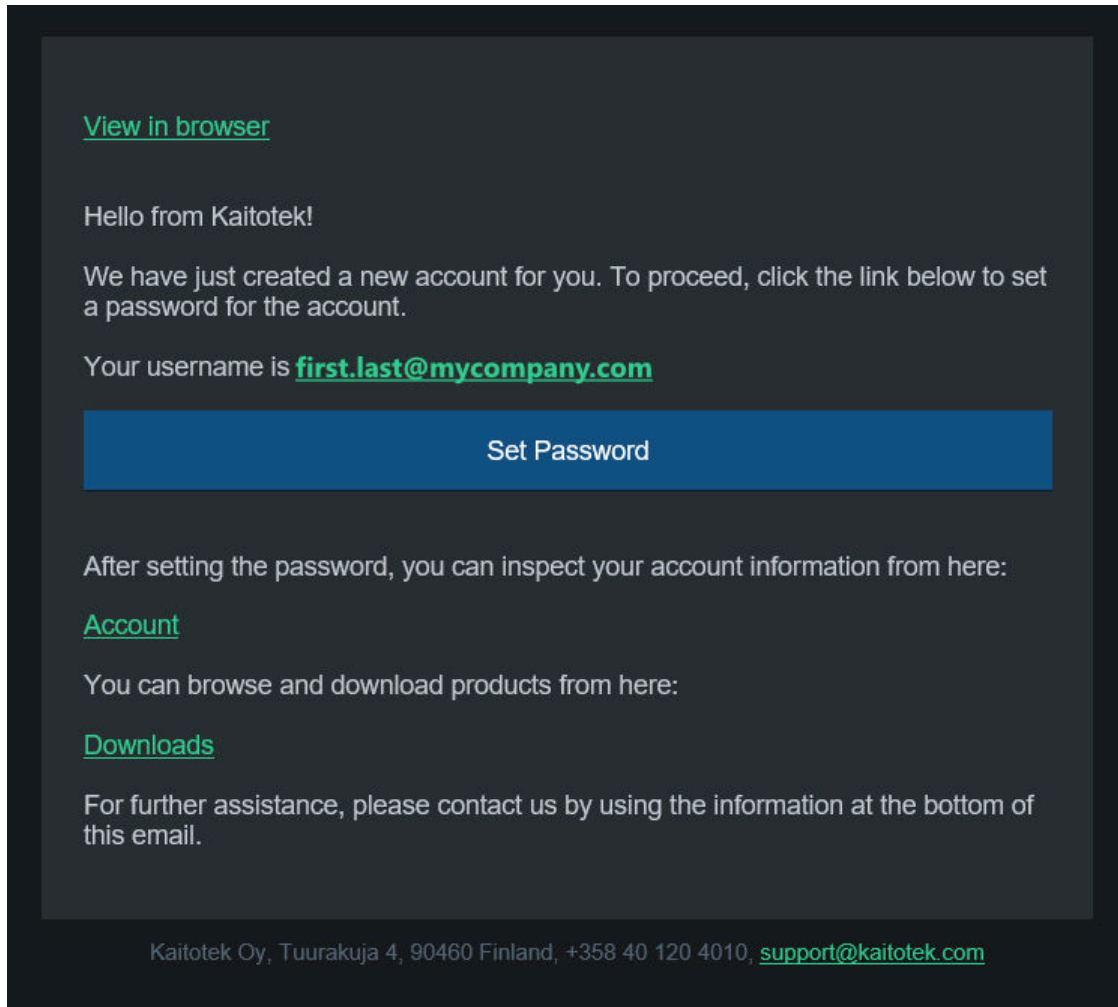
smoothly



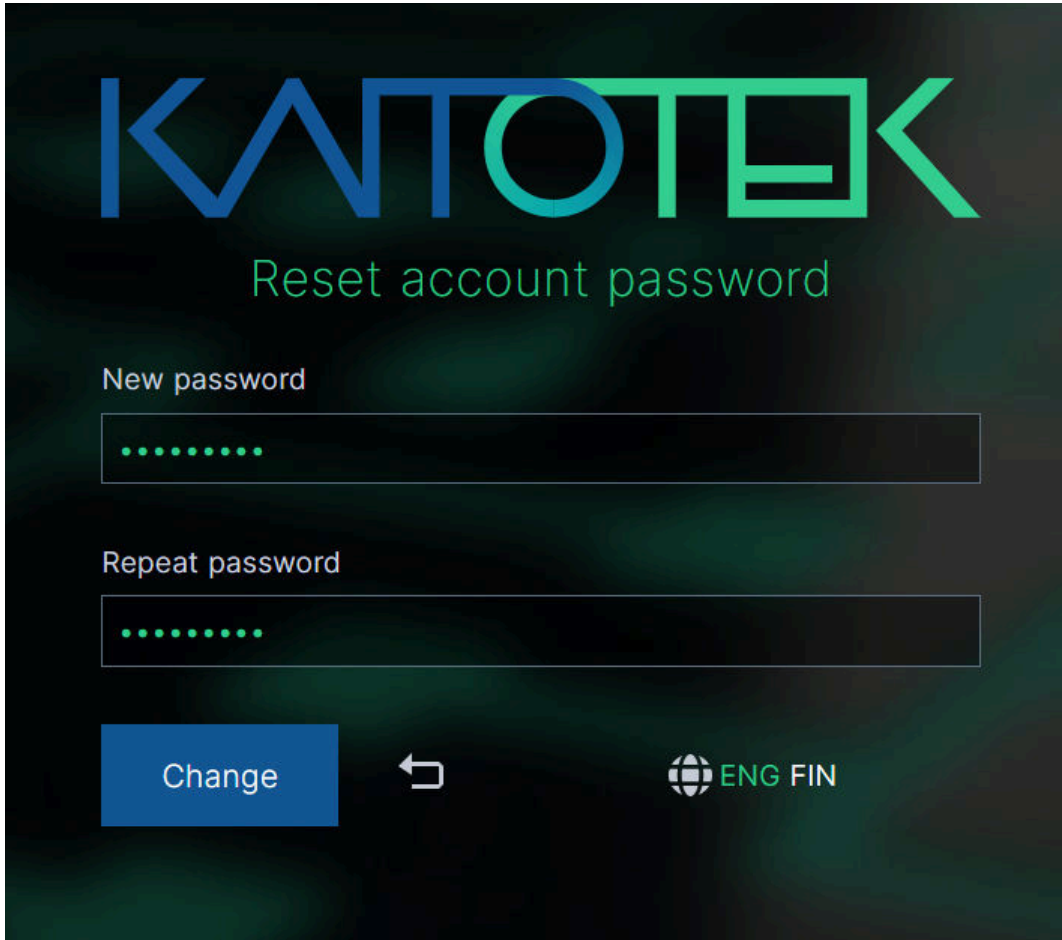
If the window looks distinctly different, you might have failed to fill the fields correctly. In that case, please try again.

Next, open your mailbox. A welcome email should have arrived, which gives an overview of your new account.

If the email didn't arrive, refresh your mailbox. Check the junk mail folder as well since some email servers may classify automated emails as spam. If you didn't receive an email, please contact tuki@kaitotek.fi for assistance.



Press **Set Password**, which takes you to the password reset page. Here you may create a password for your account. Be sure to use a unique, strong password with at least 8 characters. Type the password twice and then press **Change**.

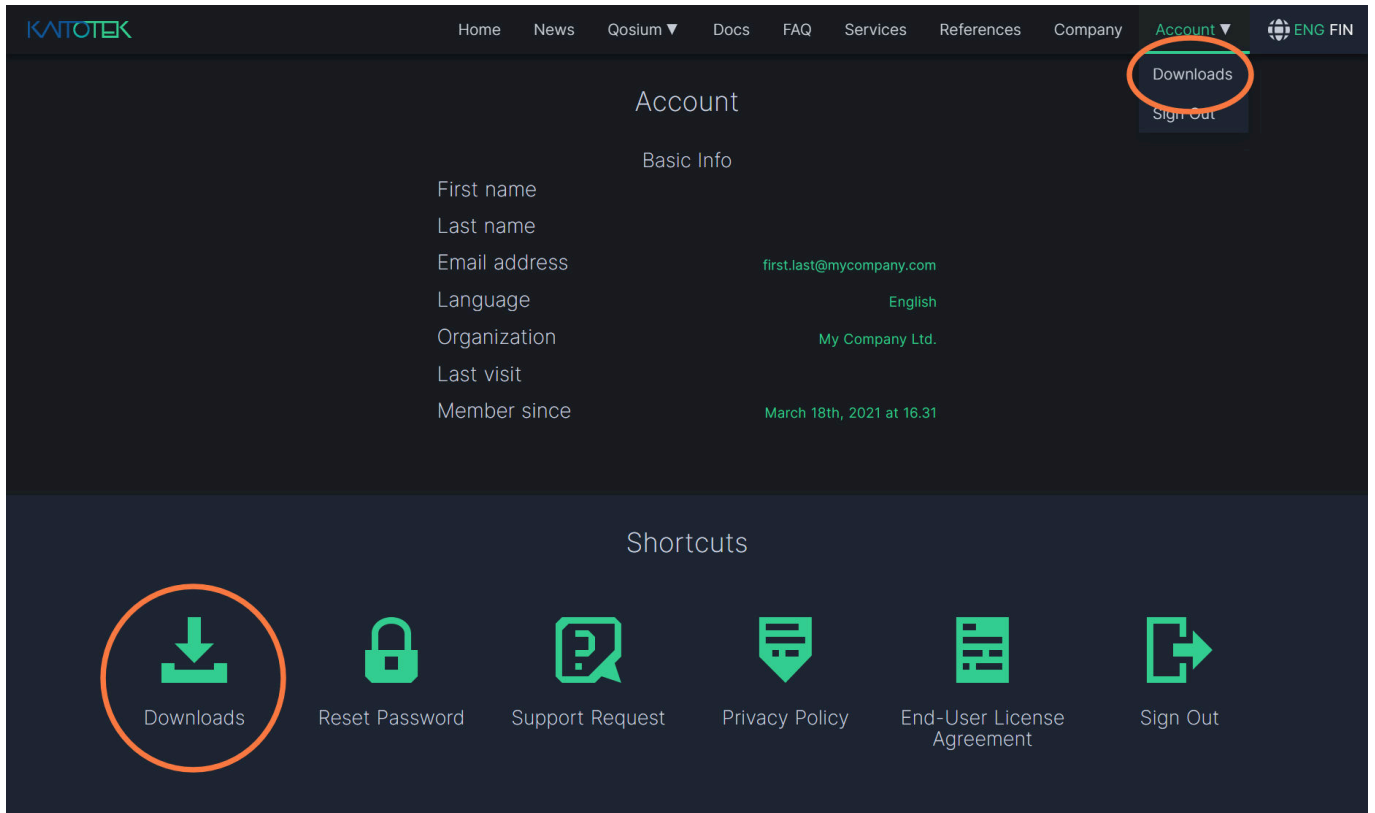


1.2. Sign In & Download Installer

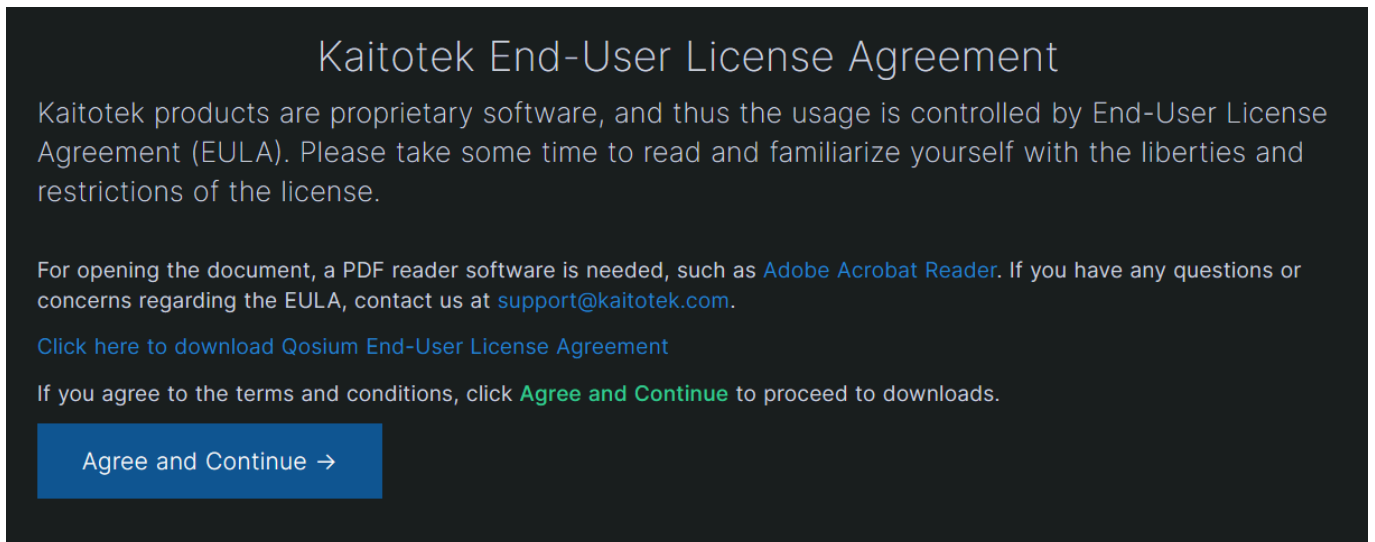
After creating the password successfully, you'll be redirected to [the Sign In page](#). Type in your email address and the freshly created password, and then press **Sign In**.



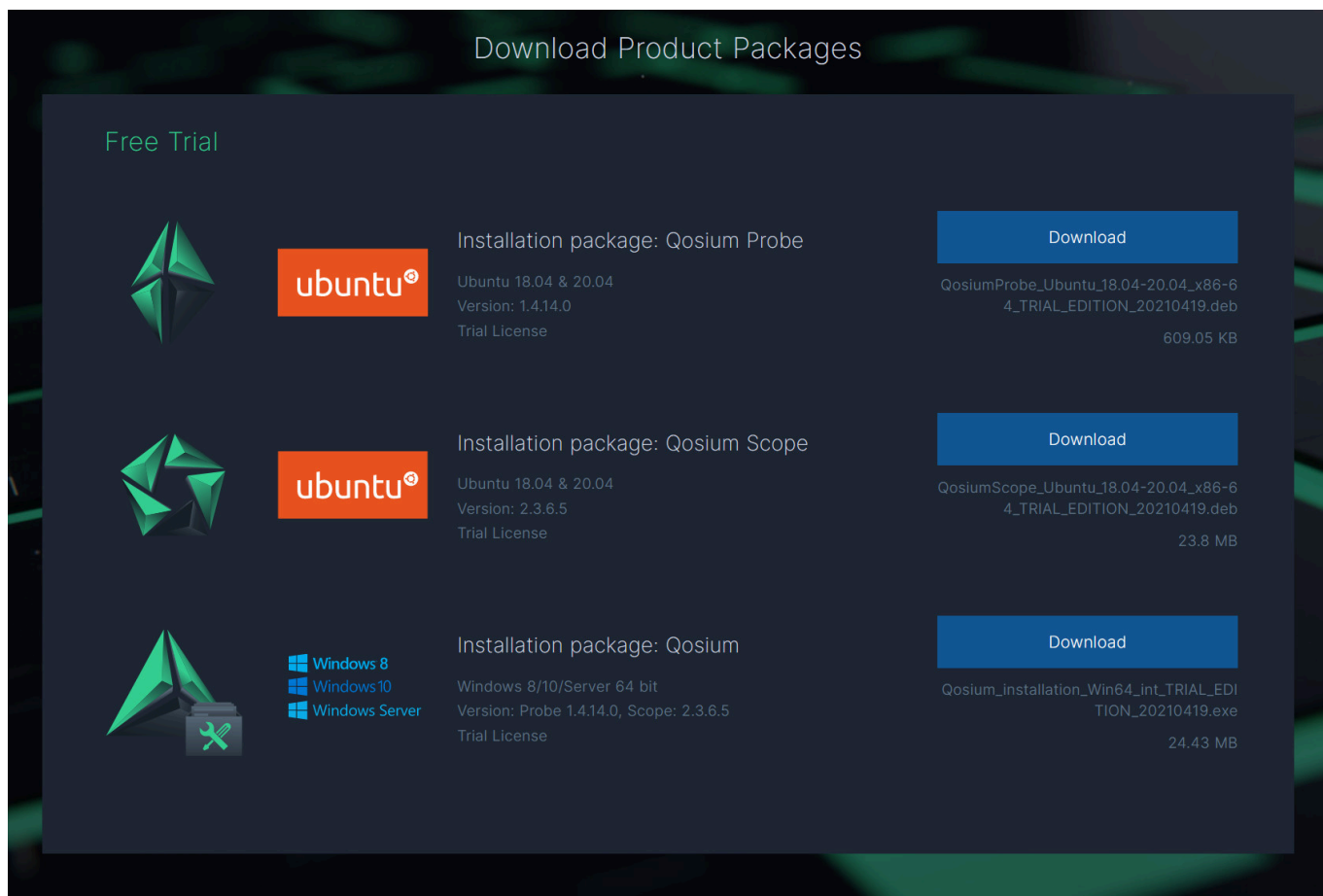
After signing in, you will be redirected to your account page. Continue to the [Downloads page](#) either from the top menu or from the account shortcuts.



Before downloading Qosium products, you'll have to accept the End-User License Agreement (EULA). Follow the instructions for reading the EULA, then click **Agree and Continue**.



The downloads page lists one product package called *Trial Edition*, which contains Qosium Trial Editions listed operating systems. Locate the installer with your preferred operating system and press **Download**. For Windows, a single installer is available, while for Ubuntu you'll need to download Qosium Probe and Scope separately.



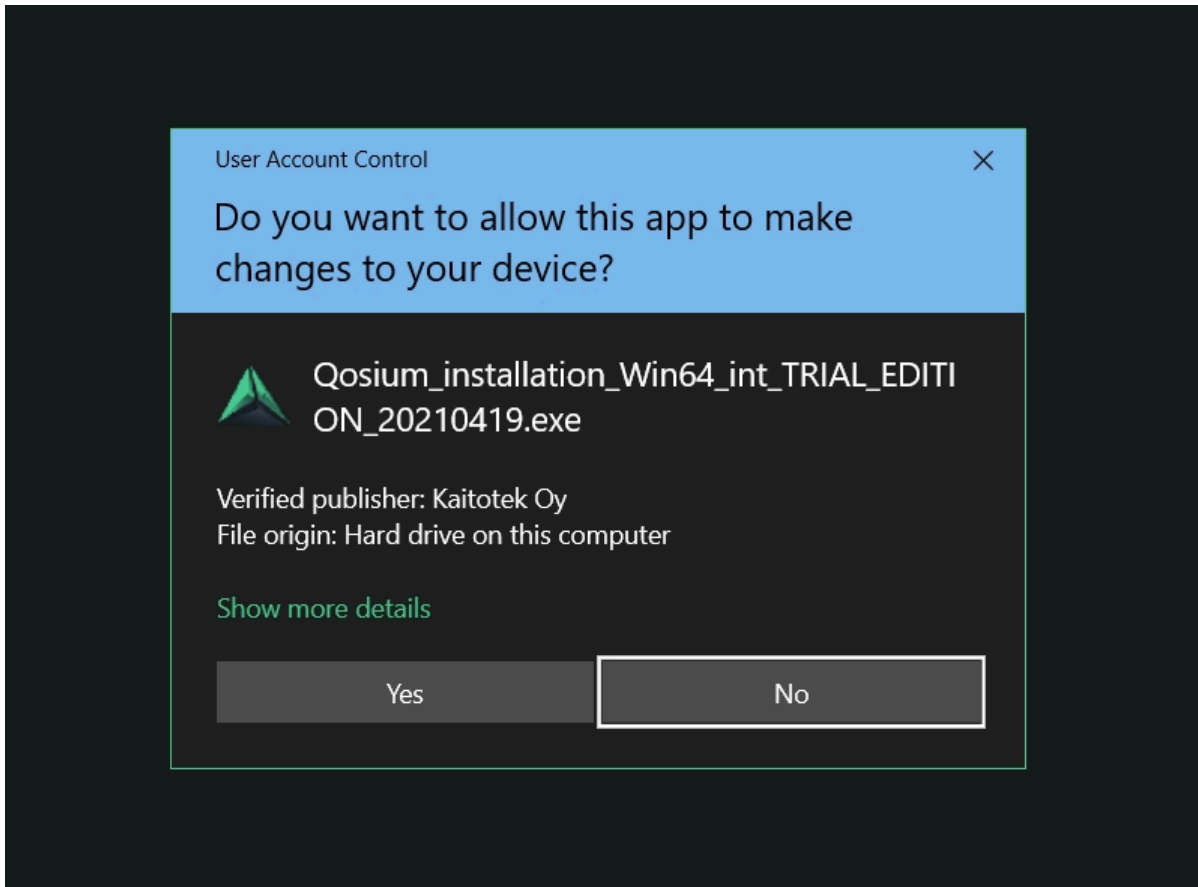
1.3. Install Qosium Trial Edition on Windows

Before launching the installer, you'll need to install a **packet capture library** if you intend to run Probe in this machine. Follow our guide on [installing a packet capture library on Windows](#).

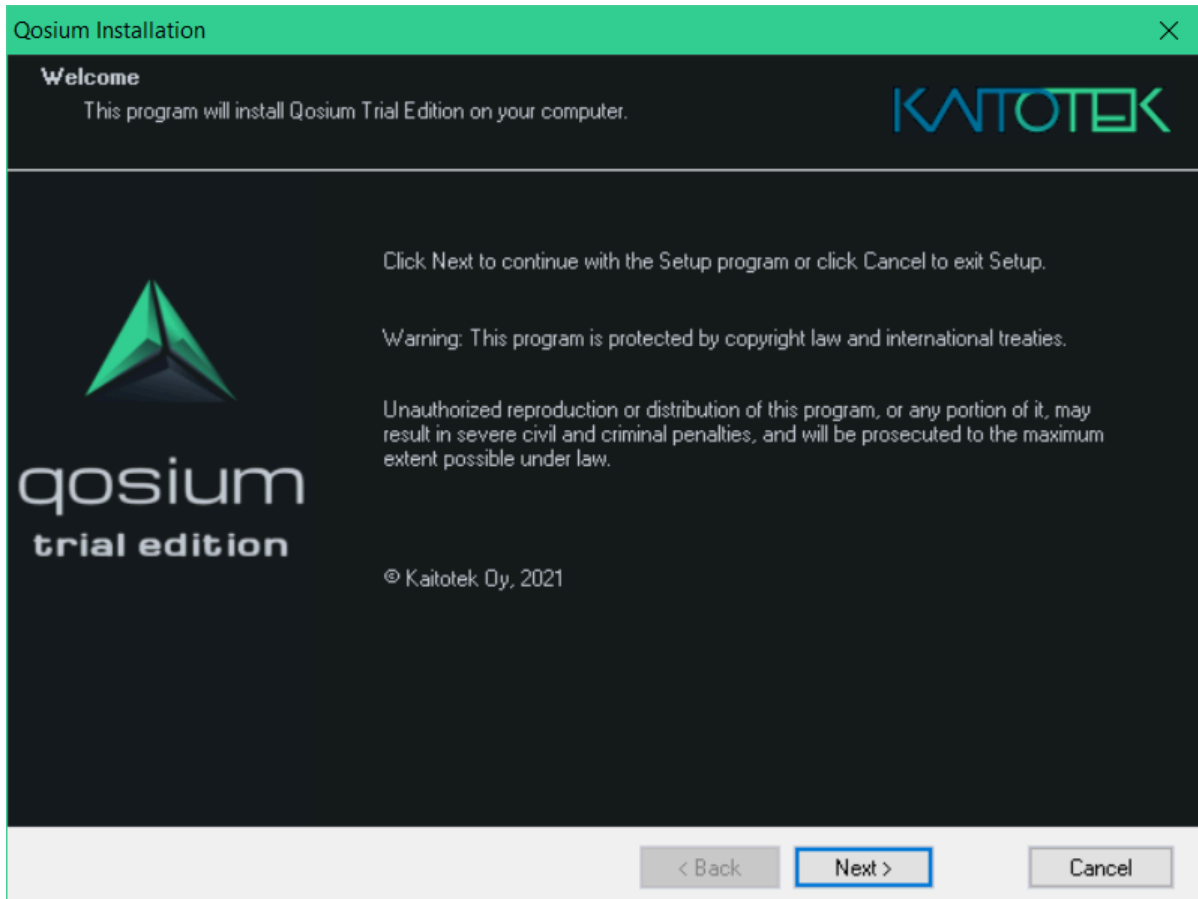


It is highly recommended to install a packet capture library before proceeding to install Qosium. The Qosium installer provides some automated configuration for packet capturing, but installing a packet capture library afterward can invalidate these configurations.

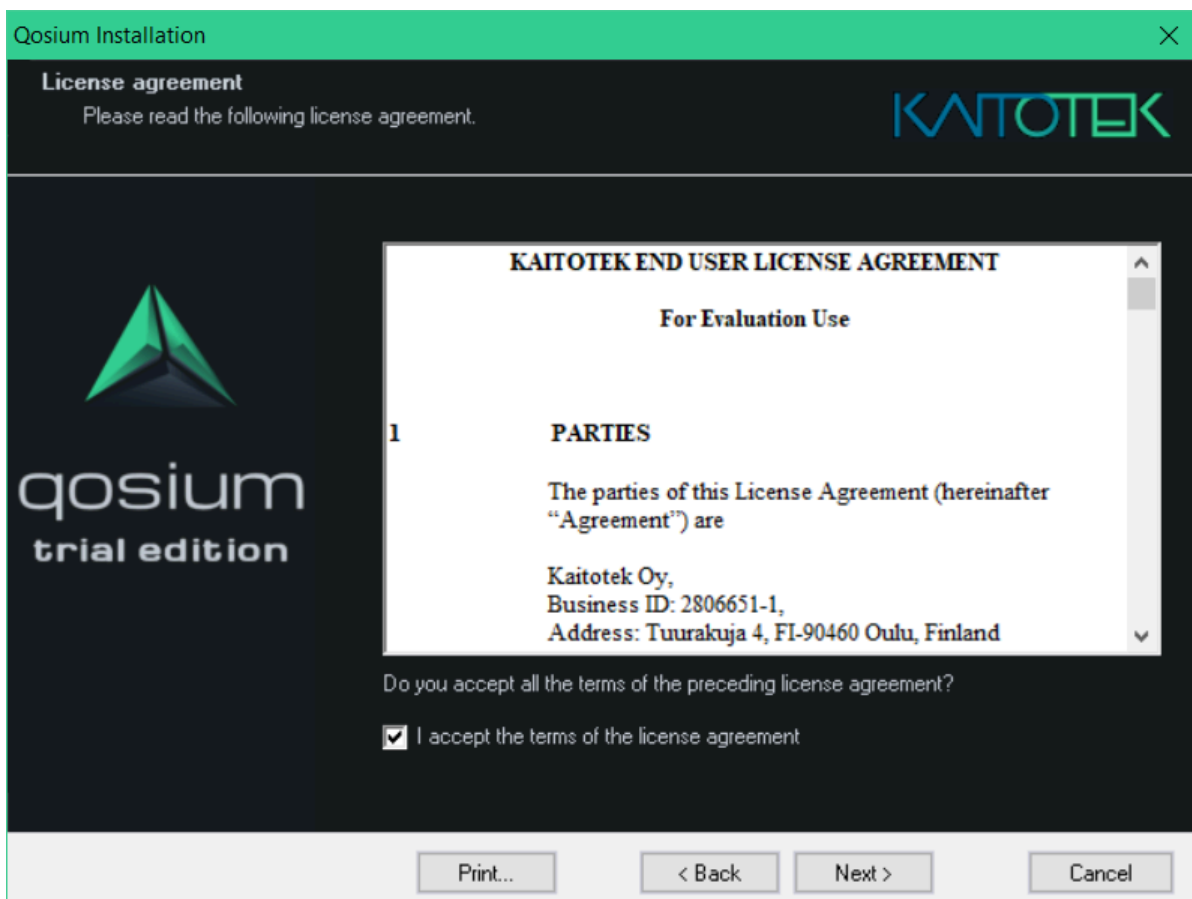
After completing the packet capture library installation, locate and launch the Qosium Trial Edition installer file that you downloaded. After launching, proceed by clicking **Yes** on Windows *User Account Control* permission prompt.



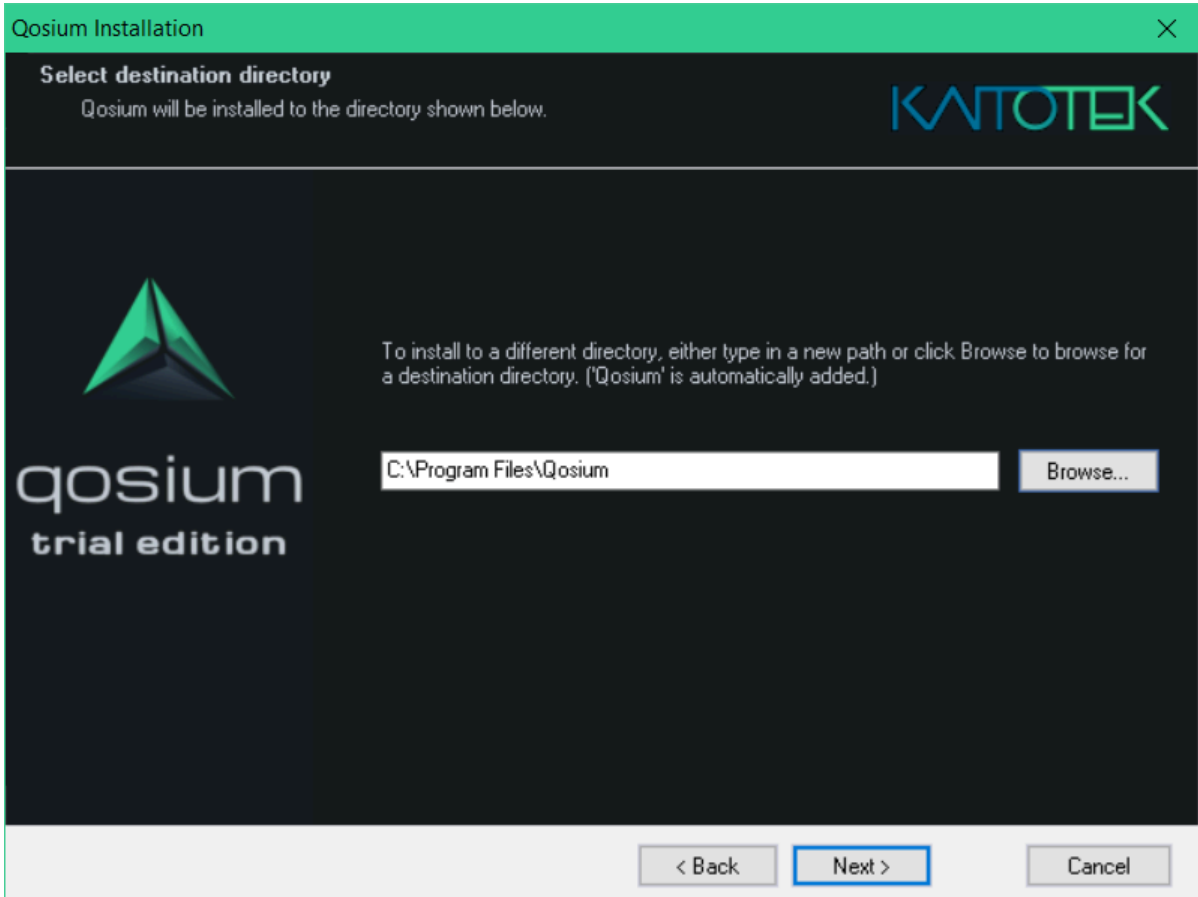
On the first page of the installer, click **Next** to proceed.



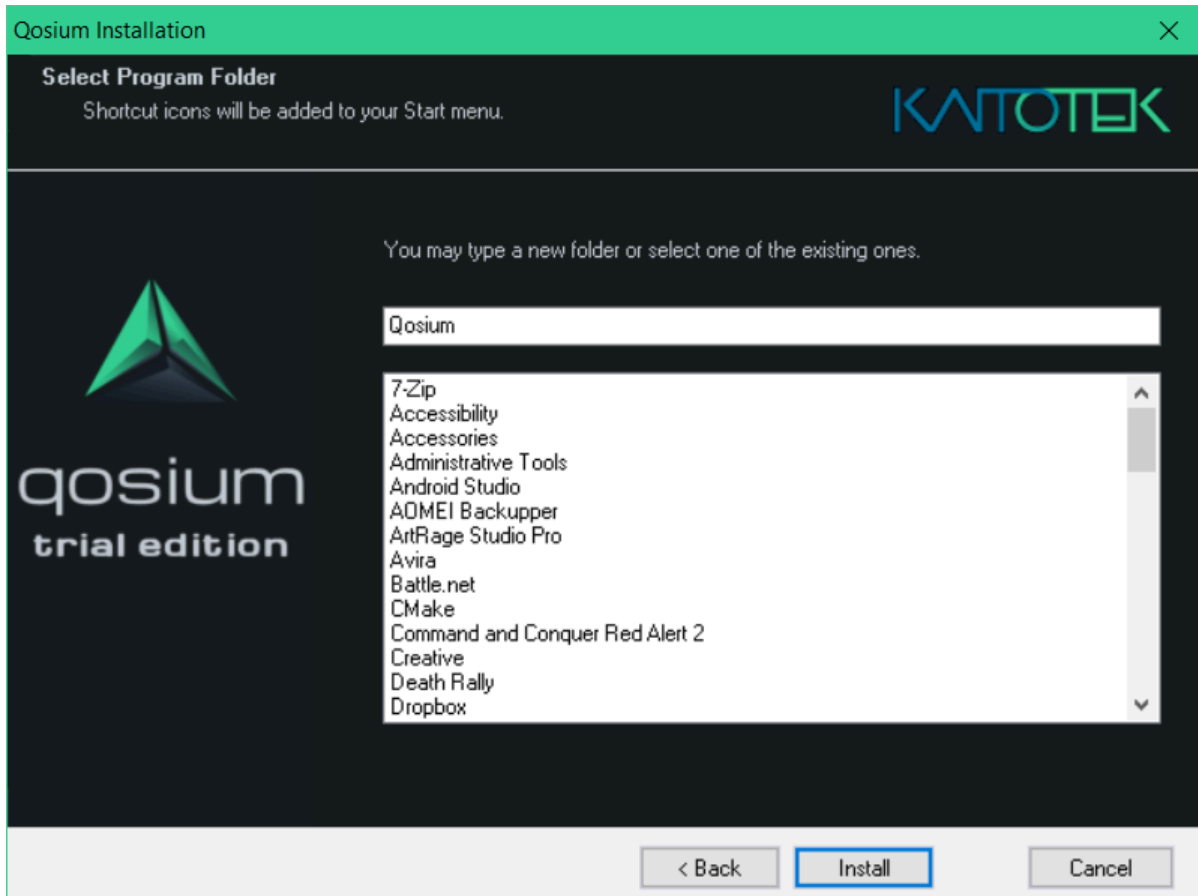
The installer prompts you to accept the End User License Agreement (EULA). If you haven't yet read the EULA, please take a few minutes to read it thoroughly. Then check *I accept the terms of the license agreement* and click **Next** to proceed.



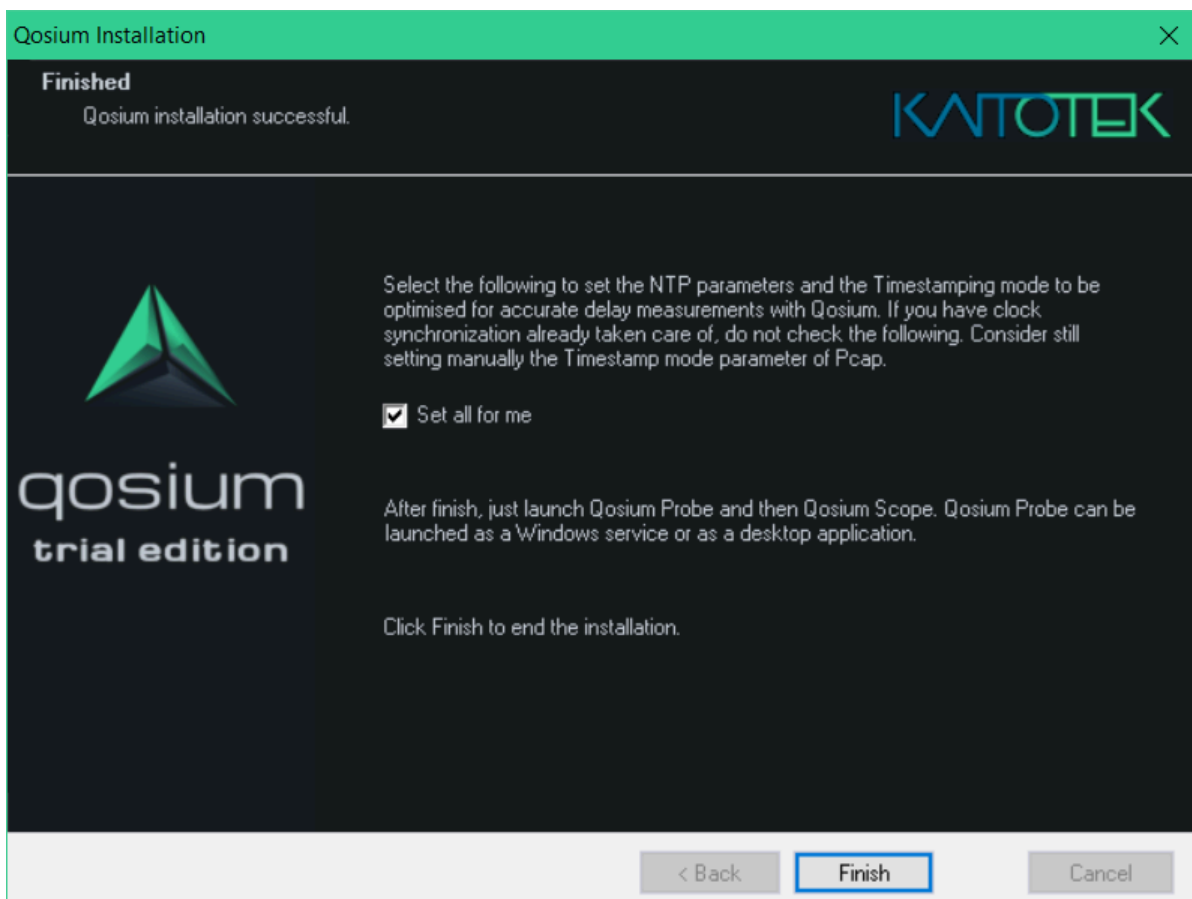
In the next step, you may change the installation directory for Qosium.



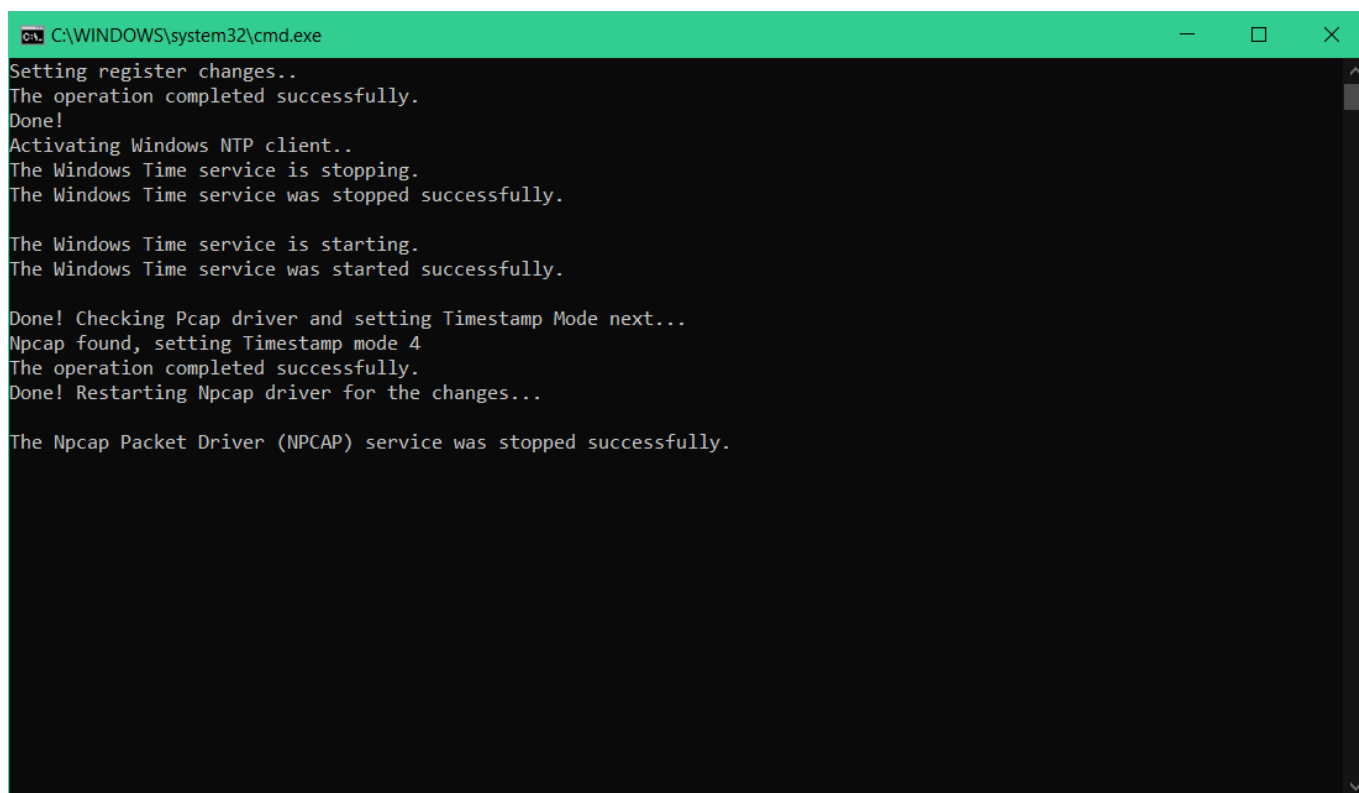
The next step considers the *Start Menu* shortcuts. It is recommended to leave the settings to default.



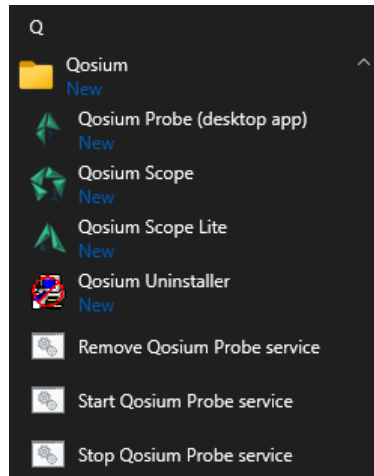
During the next step, Qosium will be installed in your system. After the installation process has been completed, you'll be prompted to automatically set your computer system clock synchronization parameters to optimal settings. If you hadn't installed Qosium to this computer before or adjusted any synchronization settings before, it is recommended to select *Set all for me*. Then click **Finish**.



If you selected *Set all for me*, the installer updates your system with optimal values.



Your installation is now complete. You can find the freshly installed Qosium in the start menu:



Use *Qosium Probe (desktop app)* to launch Probe in a command prompt window. Alternatively, select *Start Qosium Probe service* to set the Probe as an active Windows service. In that way, Qosium Probe is always in the background and starts with your device. To stop it, select *Stop Qosium Probe service*. To remove it from the Windows' service list, select *Remove Qosium Probe service*.

Launch Scope by selecting **Qosium Scope** from shortcuts. More launch options for Scope can be found [here](#).

1.4. Install Qosium Trial Edition on Ubuntu

Qosium Probe and Scope are delivered as a deb software package, which can be installed with both *dpkg* and *apt*.

1.4.1. Qosium Probe Installation

To install a fresh or upgrade an existing Qosium Probe in a machine, open Terminal and run:

```
sudo dpkg -i QosiumProbe_<version_details>.deb
```

It is also possible to use *apt* and *apt-get* for the installation. These methods also install all dependencies automatically. Qosium Probe has only one external dependency, namely *libpcap*. Ubuntu typically comes with that library, but if you have made big changes to the operating system libraries and content, it may be useful to use, e.g., *apt-get*, when the installation happens the following way:

```
sudo apt-get install ./QosiumProbe_<version_details>.deb
```

The installation process asks all the relevant details, e.g., whether or not to install Qosium Probe as a Systemd service, etc.

1.4.2. Launching Qosium Probe

1.4.2.1. Manual Start

Run the following command in terminal (use *sudo* in front of the command if you don't have *superuser* privileges):

```
/opt/QosiumProbe/bin/QosiumProbe
```

Probe can be set in the background by pressing *Ctrl-Z* and typing `bg`, or adding `&` to the end of the command line.



If you installed Qosium Probe to be a background service, you might have Probe running already, and Probe won't start. You cannot, and don't need to, have more than one Qosium Probe instance per machine.

1.4.2.2. Qosium Probe Installed as Service

If you installed Qosium Probe as a Systemd service, controlling of Qosium Probe happens with *systemctl* commands. Qosium Probe is launched automatically upon installation and device startup. Omit *sudo* from the commands below if you are *superuser* or *sudo* is not supported by the operating system.

Start:

```
sudo systemctl start QosiumProbe
```

Stop:

```
sudo systemctl stop QosiumProbe
```

Request status:

```
sudo systemctl status QosiumProbe
```

Disable Qosium Probe from starting automatically upon reboot:

```
sudo systemctl disable QosiumProbe
```

Enable Qosium Probe to start automatically upon reboot:

```
sudo systemctl enable QosiumProbe
```

1.4.3. Qosium Scope Installation

To install Qosium Scope, open terminal and run


```
sudo dpkg -i QosiumScope_<version_details>.deb
```

Similarly to Qosium Probe installation, you can also use *apt* and *apt-get* to install the Qosium Scope from the deb package.

1.4.4. Launching Qosium Scope

After installation, Scope can be launched by executing the following command in the terminal:

```
/opt/QosiumScope/bin/QosiumScope
```

 Qosium Scope does not require superuser privileges.

1.4.5. Uninstallation of Qosium Probe and Qosium Scope

To remove Qosium Probe from the machine, run:

```
sudo dpkg -r qosiumprobe
```

To remove Qosium Scope from the machine, run:


```
sudo dpkg -r qosiumscope
```

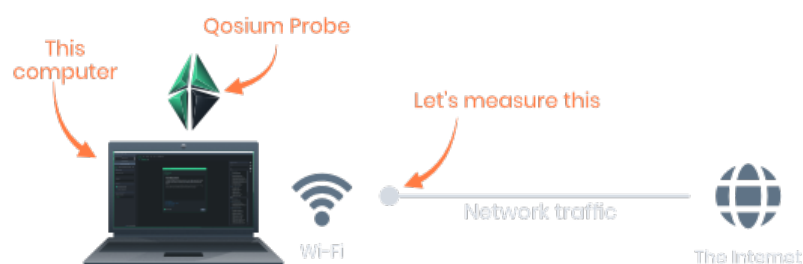
2. First Measurement With Qosium

This tutorial will guide you on how to configure and perform a very simple measurement with Qosium Probe and Scope. Learning this basic tutorial will help you to understand the workflow of Qosium Scope.

2.1. Introduction

In this tutorial, we have one Qosium Probe installed on the same computer where Scope is running, and we want to measure traffic coming from the Internet to this computer. The computer is connected to the Internet via a Wi-Fi connection. Our goal is to use the local Probe to measure how much traffic is received and sent between this computer and the Internet.

 Ethernet or any other type of connection is also OK, as long as there's an interface Qosium can use to capture traffic.



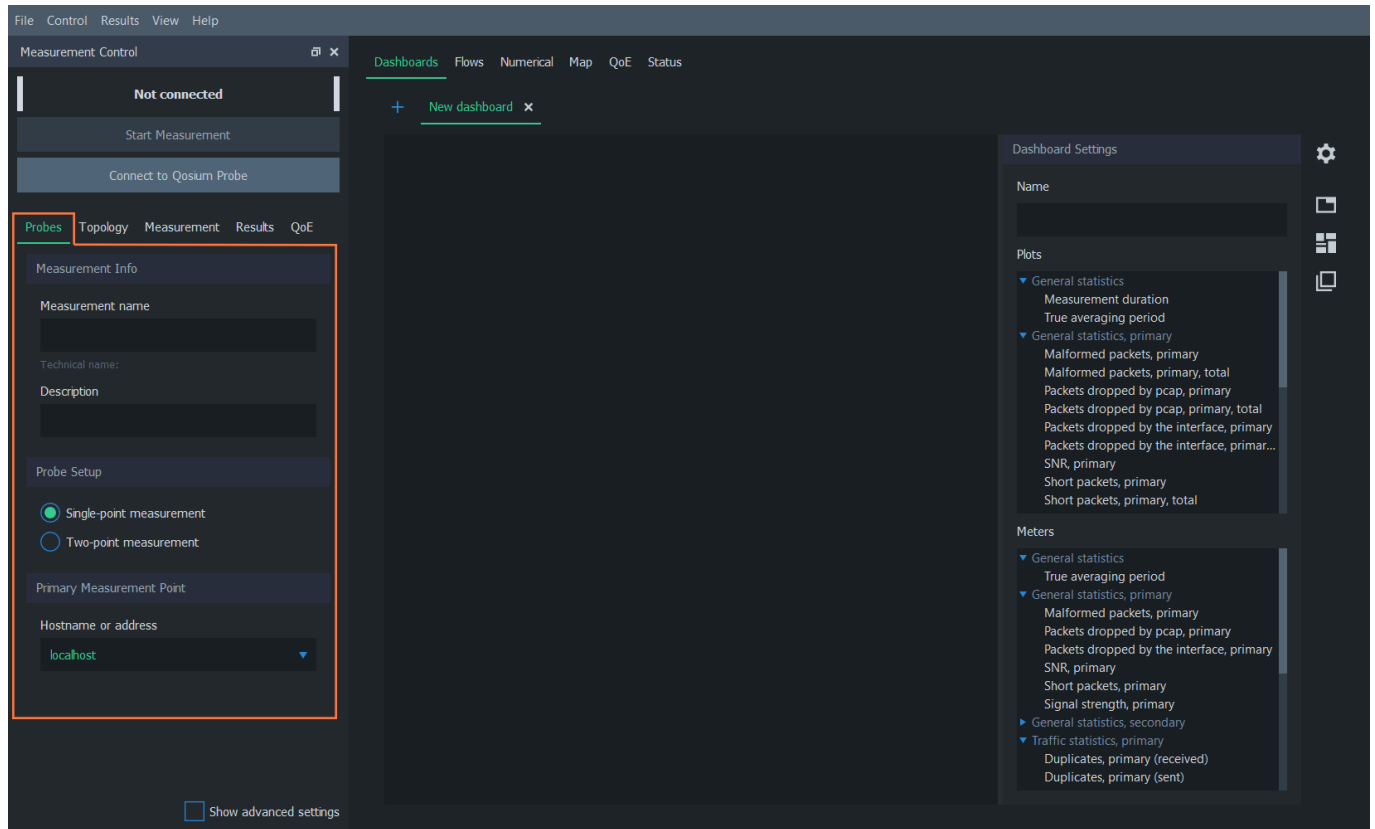
2.2. Preparation

First, install and launch [Probe](#) and [Scope](#) in the computer where you are carrying out this exercise. Make sure that the computer is connected to the Internet.

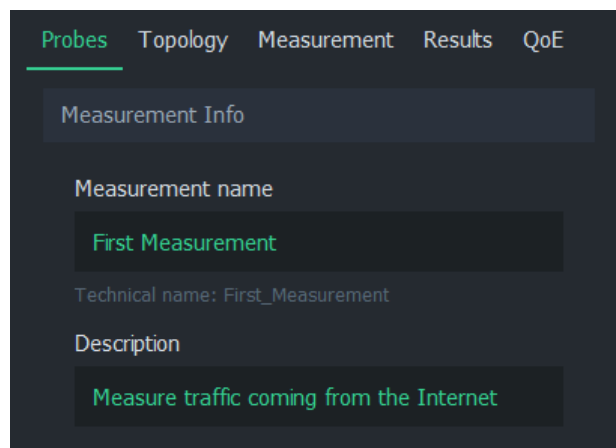
 If Scope was already running, select File->New Measurement before starting this exercise

2.3. Setup Probes

Navigate to the [Probes Tab](#), which is on the left side in Scope window inside the *Measurement Control* panel.

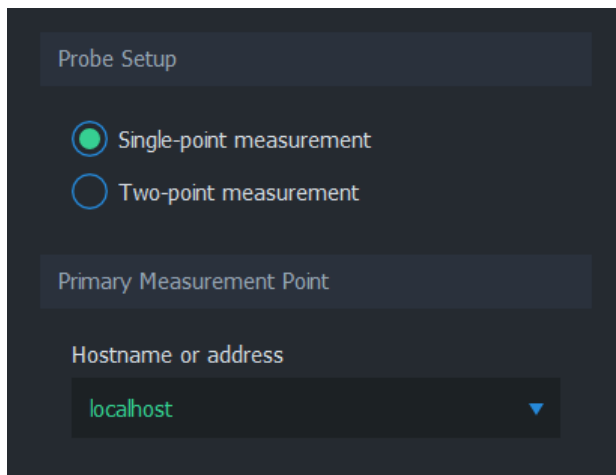


In the **Measurement Info** group, give your measurement a name and a brief description.



Next, define the measurement type. In a single-point measurement, only one Probe is used, yielding mainly traffic and flow statistics. In a two-point measurement, full QoS statistics can be measured in the network path between the selected Probes.

In this tutorial, we are only studying basic traffic statistics, so we leave this option to **Single-point measurement**.

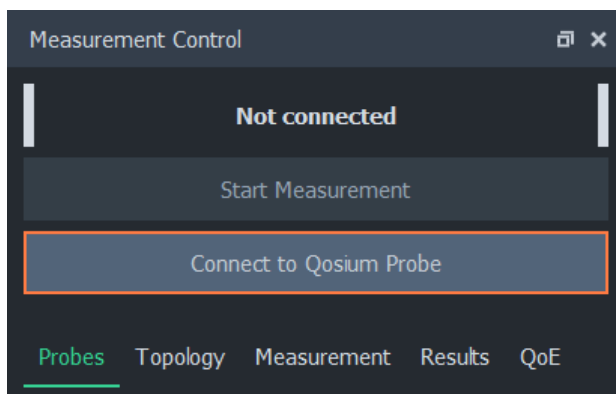


The location where the selected Probe is installed is called the **Primary Measurement Point**. The *Hostname or address* of this location can be given as a hostname or as a plain IP address, for example `node.domain.com` or `192.168.1.3`.

In our case, the Probe is running on the same PC as Scope, therefore we can simply write either `localhost` or `127.0.0.1`.

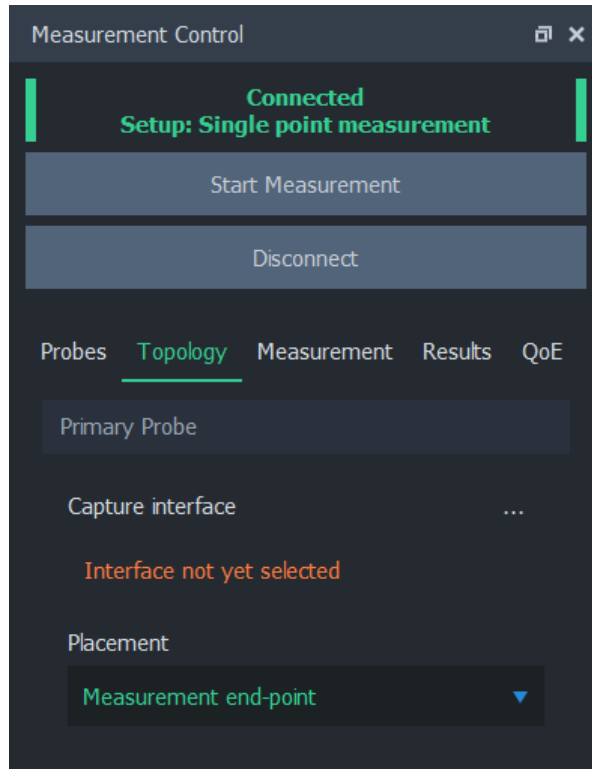
2.4. Connect and Define Topology

We are now ready to establish a connection to our *primary measurement point* by pressing **Connect to Qosium Probe**. Scope will then attempt to contact the Probe in this same computer.

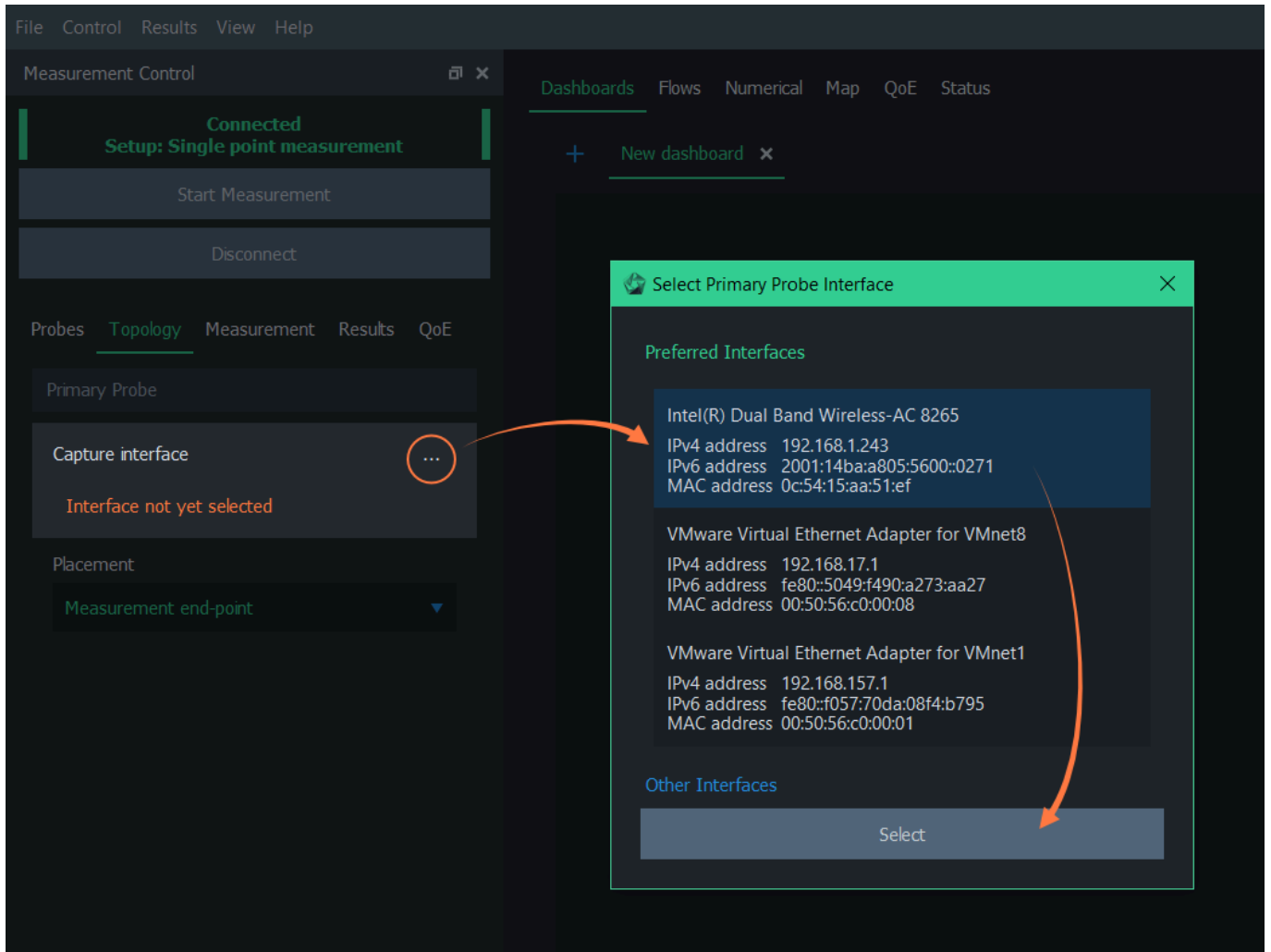


If this results in an error, it means that Scope is unable to establish connection to the Probe. In this case, check that the Probe is running on the background and try again.

If a green *Connected* text appears, as depicted below, Scope was able to connect to the Probe successfully. Scope automatically switched us to the [Topology Tab](#), where a few things must be taken care of before starting the measurement.

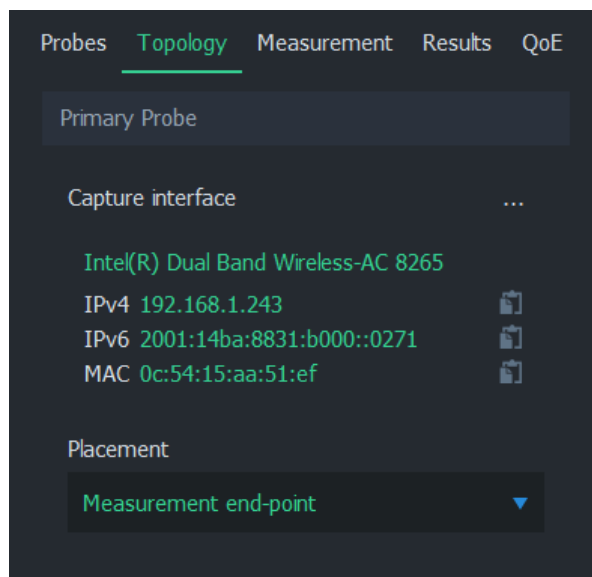


The Probe needs to know which network interface it is supposed to listen to during measurement. Select the interface by pressing ... on the right side of *Capture interface*. A dialog opens, which lists the interfaces of this computer.



We'll select the network card which is connected to the Internet from the dropdown list by double-clicking, or clicking it once and then pressing **Select**. In this computer, that interface would be *Intel(R) Dual Band Wireless-AC 8265*.

The selected interface is now displayed in the *Primary Probe* group.



Next, we need to tell Qosium something about the network topology in order to help it determine the direction of the traffic. In a single-point measurement, we only need to inform Scope the placement of the Probe in relation to the measurement path. The options are:

- **Measurement end-point** - Probe is located in either one of the end-points of the traffic we want to measure
- **Within measured path** - Probe is located somewhere in the path of the traffic we want to measure
- **Off-path (mirrored traffic)** - Probe is located outside the path of the traffic we want to measure

Luckily, our case is straightforward: the Probe is located in one of the end-points, so no further parameterization is needed here.

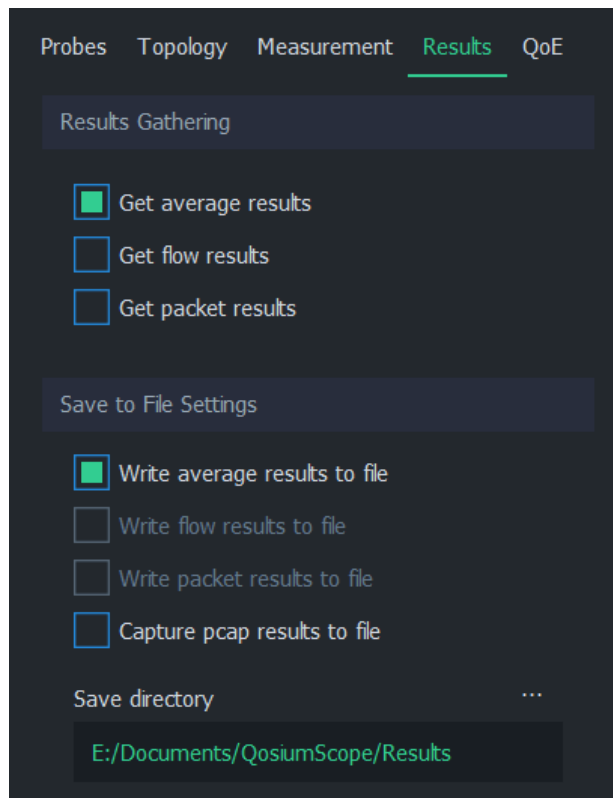
Why Placement Matters

Qosium has no way to tell what is considered *received / downlink traffic*, and what is *sent / uplink traffic*, unless it knows something about the measurement topology. Defining Probe placement is a simple way to give Qosium a hint how it should define the direction of traffic. If the placement information is not enough, Scope will ask for additional senders definition. For more information, see [Understanding Measurement Topology](#).

2.5. Configure Measurement

All essential work is already done, and we could start the measurement already. However, let's head to the [Results Tab](#) and configure Scope to save the measurement results to a file in real-time.

Under the *Results tab* we can select the result types we want to gather, and whether they are written to local files. For this scenario, we only need the average results, so let's uncheck *Get flow results*. Let's select **Write average results to file**. Now, average results will be saved to a file in real-time during measurement.

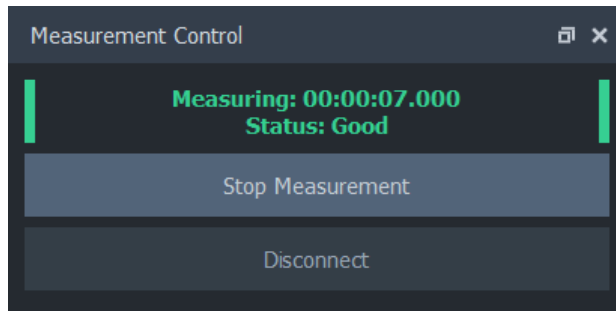


Also, mind the directory where the measurement results are saved. With the given settings, our average results will be written (in Windows) to

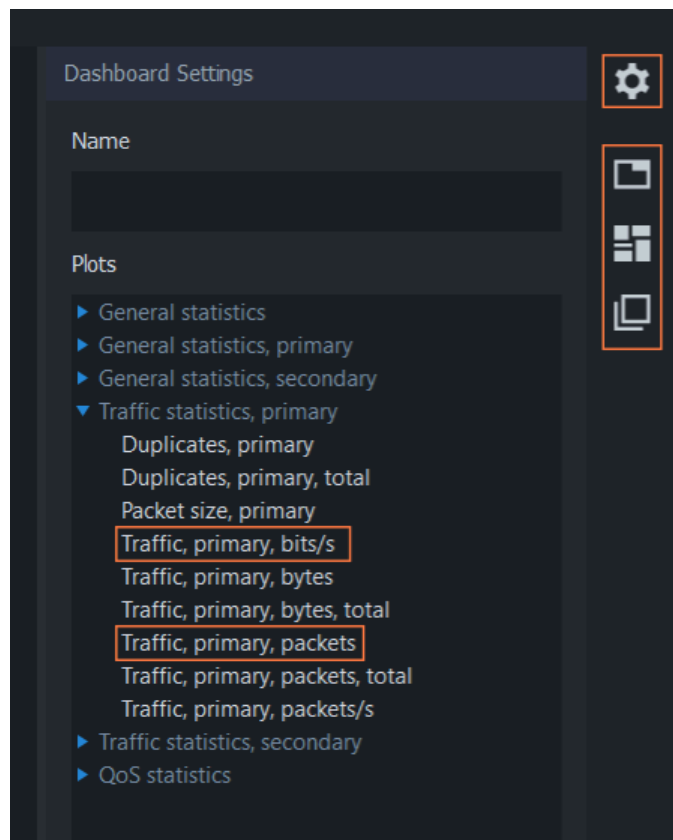
`E:\Documents\QosiumScope\Results\averages_First_Measurement.txt`.

2.6. Start Measurement

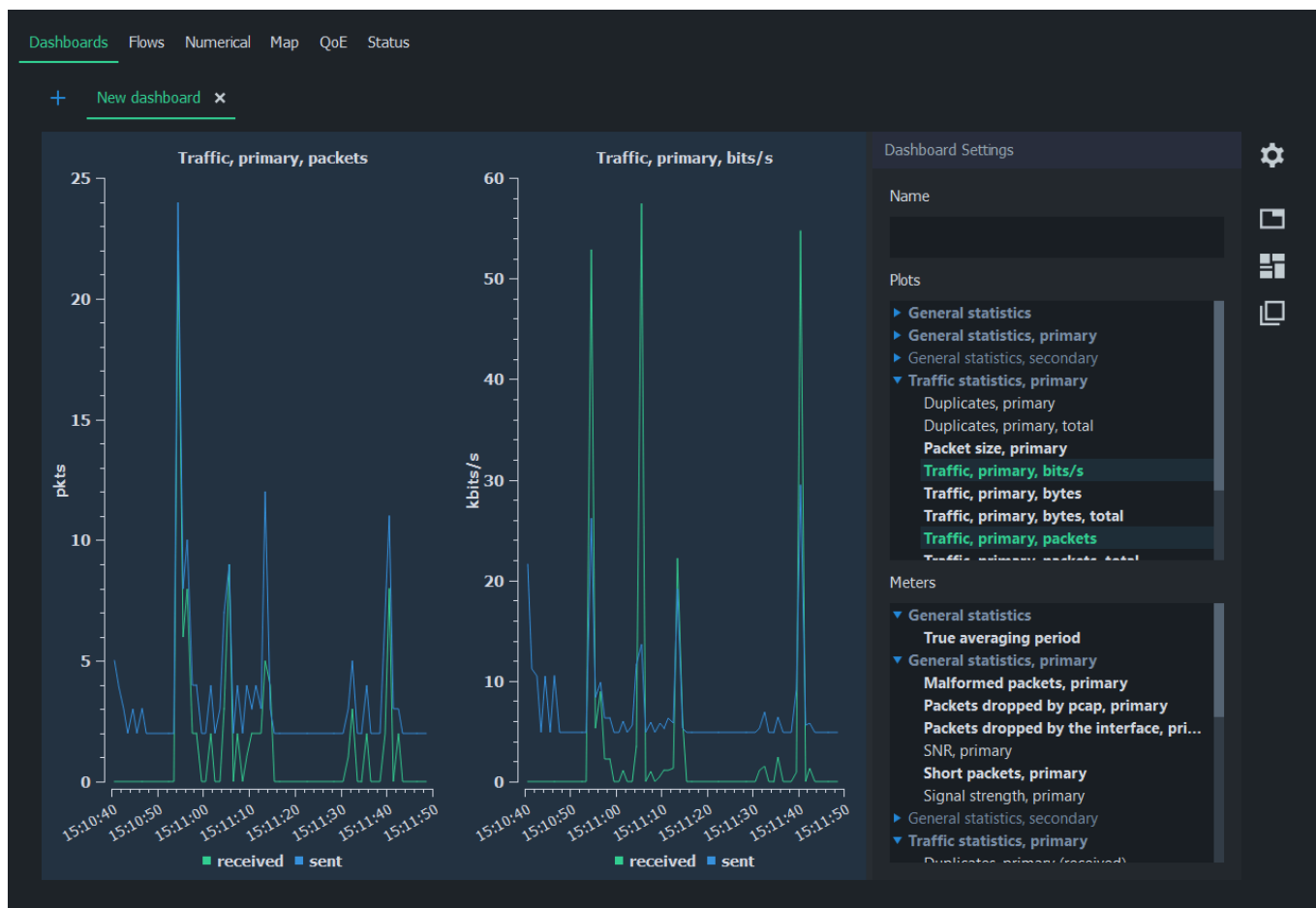
Everything is now set, so let's press **Start Measurement** button. The measurement starts running, as indicated by the status text:



Let's leave the measurement running and check out some measurement results. By default, Scope has **Dashboards** tab open. On the right side is the *Dashboard Settings* panel. If the panel is not visible, press the gear icon.



From the Plots list, select two result types: *Traffic, primary, bits/s* and *Traffic, primary, packets*. Two plots will appear immediately, displaying the traffic load in terms of bits and packets moving between this computer and the Internet. You can reorder and rearrange plots by using the buttons below the gear icon.



And that's it! Since we are writing the results in a file, they can be read and analyzed later in detail. When done, press **Stop Measurement**.



If you forgot to enable the real-time result writing, you can save the results also after the measurement via the menu bar: Results -> Save Average Results...

2.7. Conclusion

While we barely scratched the surface of Scope functionality, each measurement has the same workflow:

- Setup Probes
- Setup topology
- Set parameters
- Start measurement
- Observe results

In order to learn how to perform a QoS measurement using two Probes, head to the next tutorial.

3. First QoS Measurement with Qosium

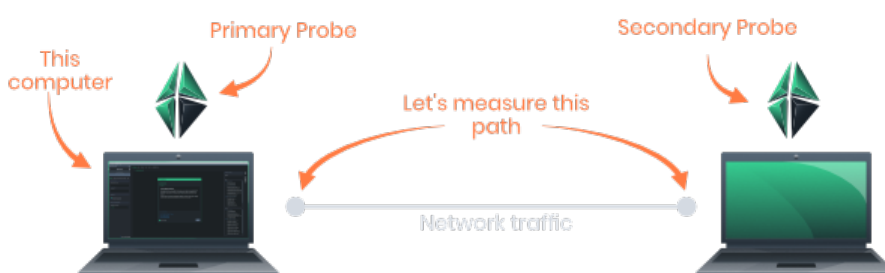
This tutorial demonstrates how to perform a minimalistic Quality of Service measurement with Qosium, using two Probes and Scope. Learning how to carry out QoS measurements with Qosium is essential, as QoS parameters are often the focus point when studying the performance of a real application.

3.1. Introduction

[Quality of Service](#) measurement means measuring parameters such as delay, jitter, and packet loss. For this type of measurement, two Qosium Probes are needed. In addition to QoS measurement, we'll also take a look at packet filters, and learn how to utilize multiple dashboards.

This tutorial is built on top of [First Measurement With Qosium](#). It is highly recommended to read it before proceeding.

In this tutorial, we have one Probe installed on the same computer where Scope is running, and another Probe on a remote computer at address `192.168.1.236`. The goal is to measure the network path between these two computers.



3.2. Preparation

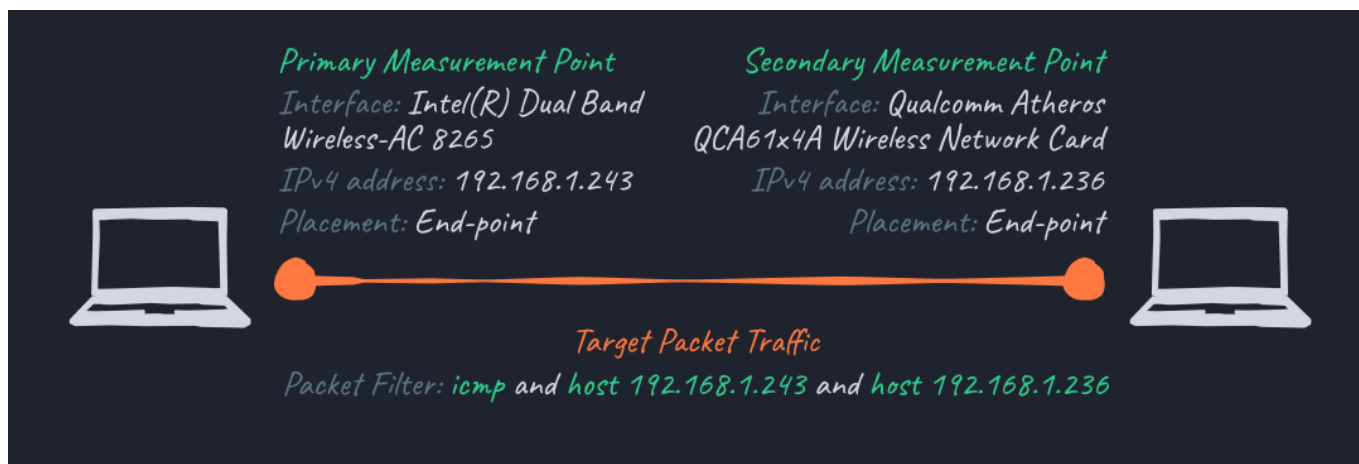
Before proceeding any further, we need to do some preparations for this tutorial. For a QoS measurement with Qosium, we need an actual application to measure. Since this is a quick tutorial, we won't setup a real application. Instead, we generate artificial traffic between the two computers by using `ping`.

`Ping` is already installed in most computers. It also works the same way in most operating systems. First, open a console window in one of the computers. Type `ping [address]`, where `address` is the IP address of the other computer. In this tutorial, our remote computer is at `192.168.1.236`, and therefore we type `ping 192.168.1.236`. Now we have a continuous traffic flow between the computers, which can be measured.



In Windows, ping only sends four packets and then stops. To ping continuously, type `ping 192.168.1.236 -t`

To make things more clear, let's draw a **measurement topology** diagram. This diagram contains essentially all the information we need to run this measurement. The diagram shows the network path we are going to measure, the involved devices, and the involved capture interfaces. Since we are going to measure specific traffic, we also need to define a [packet filter](#).



There can be—and most likely are—other packets traversing in and out of the involved interfaces than just our ping packets, and we want to exclude those from the measurement. This is where the *packet filter* comes into play.

Ping operates on ICMP protocol, so filtering out everything else except ICMP traffic will yield the results we want as long as no other ICMP traffic is traversing our measurement path. However, if there were another ICMP operation ongoing in one of our scenario's computer's, the measurement would give incorrect results. Thus, we add also the IP addresses of the computers to the filter, just in case. The filter then becomes: `icmp and host 192.168.1.243 and host 192.168.1.236`. This way we can be sure that only ICMP traffic between our two computers will be included in the measured traffic.

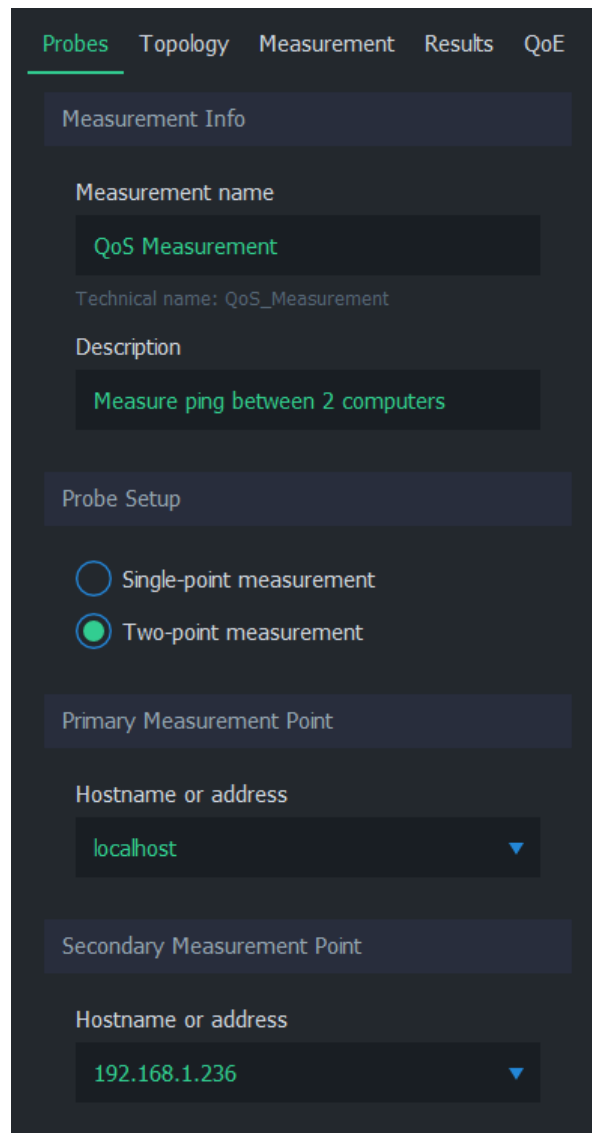
[Install](#) and [launch](#) Qosium Probes on both of these computers if you haven't already, and continue to the next section.



If Scope is already running, select File->New Measurement before starting this exercise

3.3. Setup Probes

As in the [previous tutorial](#), navigate to the *Probes tab* and fill out measurement info. But this time, we select **Two-point measurement** instead, which opens up the *Secondary Measurement Point* group. This is our remote computer, so we type the IP address `192.168.1.236` into the *Hostname* field. Our primary point is still in `localhost`, since we are running Scope in the same computer.



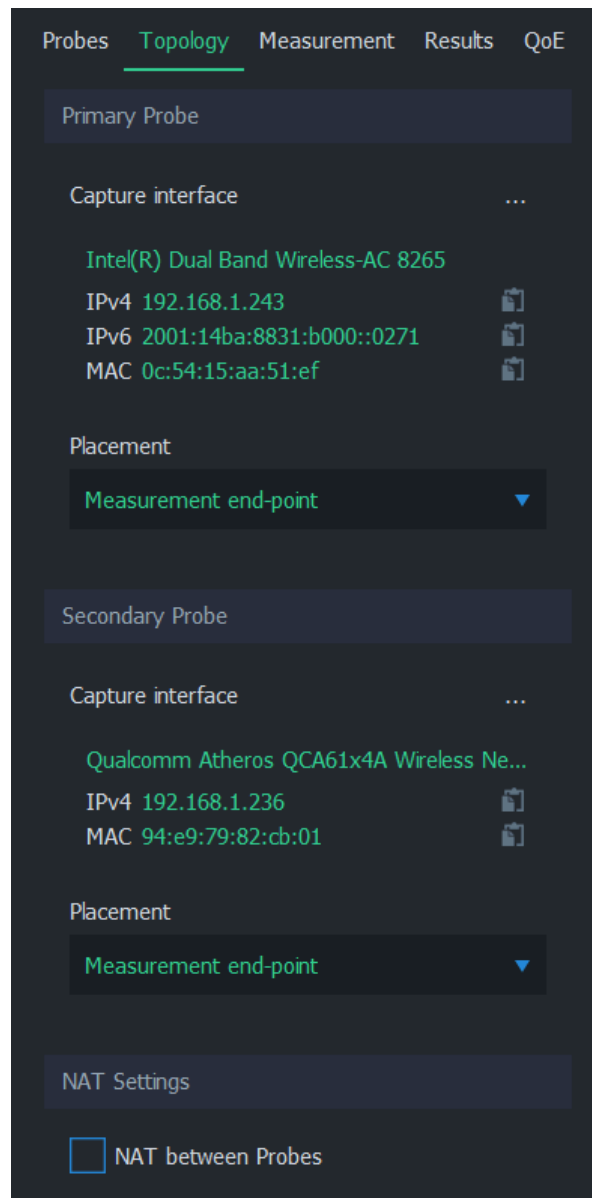
The screenshot shows the 'Probes' tab in the Qosium interface. The 'Measurement Info' section includes a 'Measurement name' field with the value 'QoS Measurement' and a 'Description' field with the value 'Measure ping between 2 computers'. The 'Probe Setup' section has two radio buttons: 'Single-point measurement' (unselected) and 'Two-point measurement' (selected). Below this, the 'Primary Measurement Point' section has a 'Hostname or address' dropdown menu with 'localhost' selected. The 'Secondary Measurement Point' section has a 'Hostname or address' dropdown menu with '192.168.1.236' selected.

That's all for Probe setup. Having a two-point measurement will require some additional setup in measurement configuration, which is explained in the next sections.

3.4. Connect and Define Topology

We are now ready to establish a connection both to our local Probe and remote Probe. As before, press **Connect to Qosium Probe**. Scope will then attempt to contact the primary Probe in this computer, which in turn communicates with the secondary Probe in the remote computer.

Once connected, Scope automatically switches to the [Topology Tab](#). For the primary Probe, the interface is the same as in the previous tutorial. For the secondary Probe, we simply select the interface which has IP address *192.168.1.236*. Since our measurement path is exactly the path between these two computers, we can again set **Placement** to *Measurement end-point* for both Probes.

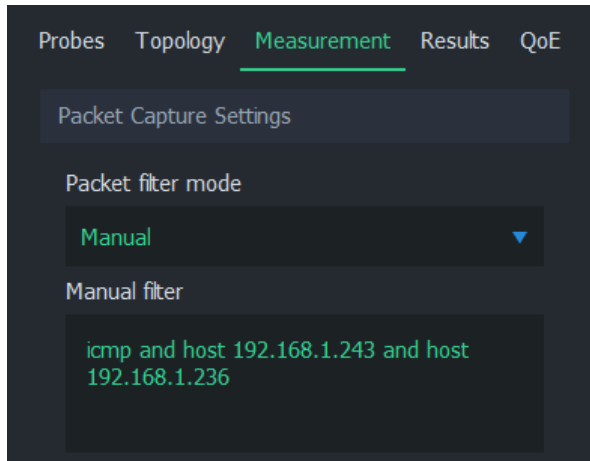


The new setting, NAT, is needed when there's a Network Address Translation between these two Probes. This is not the case in our setup, so we leave it unchecked.

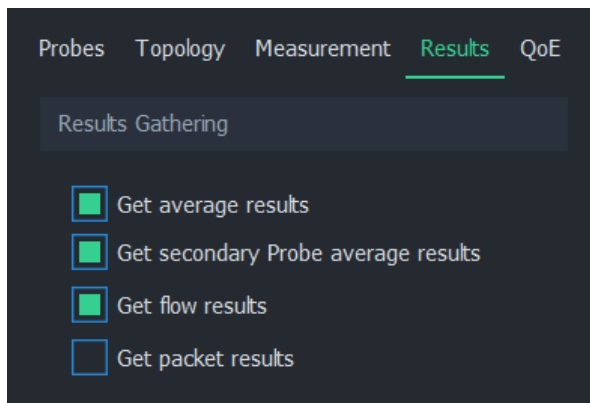
3.5. Define Packet Filter and Result Types

We could start the measurement already, but the current configuration would yield all traffic between the two computers. We only want the ping traffic to be displayed in results. Therefore, we need to define a manual packet filter.

Navigate to the [Measurement Tab](#) and change **Packet filter mode** to *Manual filter*. An additional text field appears, containing packet filter `ip` by default. Let's change it to the filter we defined earlier:



Next, open the [Results Tab](#). Let's leave both *Get average results* and *Get secondary Probe average results* on. Flow results are handy for inspecting the traffic flows traversing our measurement path, therefore we leave *Get flow results* on for verifying that the ping traffic we generated is visible in our measurement and that the packet filter is working properly.



3.6. Start Measurement

Everything is now set, so let's press **Start Measurement** button. The first thing we are going to do is to check the flows and verify that our ping traffic is being measured. Navigate to the [Flows Tab](#) next to the *Dashboards tab*. The flow table should display exactly one row:

The screenshot shows the 'Flows' tab in the Qosium interface. At the top, there are navigation tabs: 'Dashboards', 'Flows' (highlighted), 'Numerical', 'Map', 'QoE', 'Log', and 'Available Probes'. Below the tabs, there is a table with the following data:

	Source	Destination	Protocol	State	Load [b/s] (downlink)	Load [b/s] (uplink)	Age [s]	Inactivity
1	192.168.1.243	192.168.1.236	ICMP	Persistent	591	591	17,1	0

The information above indicates that one ICMP traffic flow is traversing our measurement path, which is exactly what we want to see at this point.

Now we are ready to see some QoS results. Return to the *Dashboards tab* and open a few charts. In *Dashboard Settings panel*, give this dashboard a name `QoS Plots`. Then, in the plots list, find category *QoS statistics* and expand it. Select the following plots:

- *Connection break count*
- *Delay*

- Jitter
- Lost packets, total
- Packet loss
- Successful packets, total

Close Dashboard Settings by using the gear icon on the right side of the window to allow more space for plots.

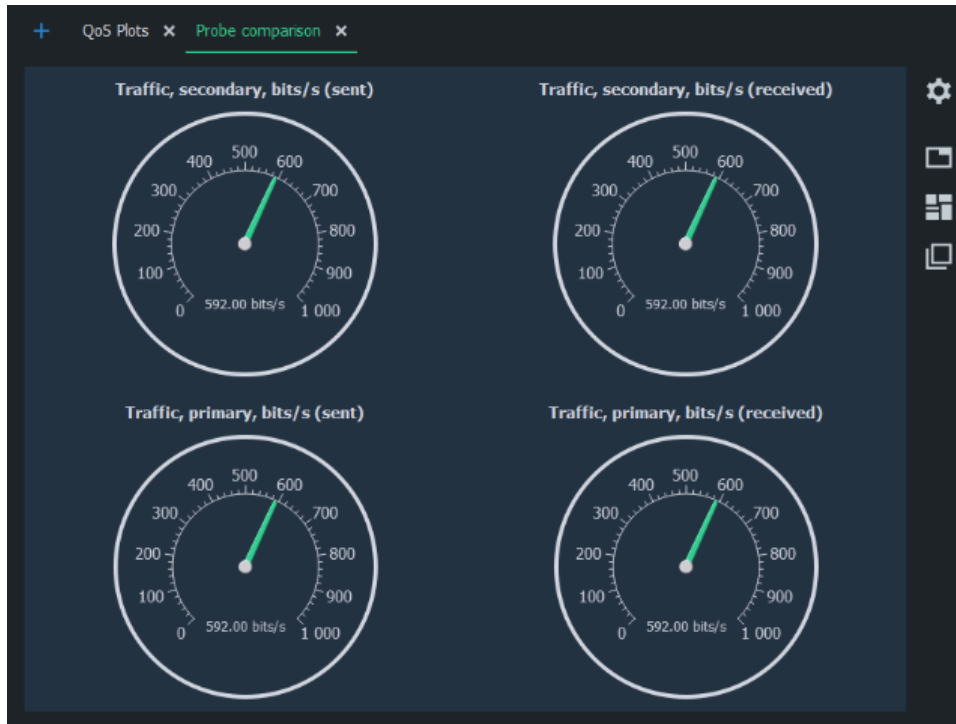


The plots already give lots of information about our test environment: The traffic has no lost packets, but there seems to be a large jitter variation. In the delay plot, we see an interesting result that delay seems to be negative to one direction and about similarly positive to the other. This is caused by clock synchronization error between the two measurement computers. See [Time Synchronization](#) for more details and how to solve it.

Out of curiosity, let's check out how both Probes see the traffic. Our current dashboard is quite full, so let's go ahead and create a new dashboard by clicking the blue plus icon next to our current dashboard tab. Rename this new tab to *Probe comparison*, and this time select a few **meters** instead of plots:

- Traffic statistics: primary
 - Traffic, primary, bits/s (received)
 - Traffic, primary, bits/s (sent)
- Traffic statistics: secondary
 - Traffic, secondary, bits/s (received)
 - Traffic, secondary, bits/s (sent)

Four meters will open, and we can see that most of the time they point to the same value. This is the expected behavior, as both Probes are registering sent and received ping messages. The meter needles can go temporarily out of sync due to packet losses and measurement timing.



3.7. Conclusion

Whether QoS measurement results indicate “good” or “bad” quality is highly dependent on the requirements set by applications. We can safely conclude that our network conditions are sufficient for non-real-time applications, but this might not be the case, for example, for industrial real-time remote control connection. Determining the limits of optimal network conditions for a certain application is a matter of [Quality of Experience](#), which is a whole another topic.

If you have already a test setup with some real traffic between two computers, it’s a good idea to try to measure that traffic now with the help of this tutorial. The process is otherwise the same, except the packet filter must be rewritten to match that traffic.

Trivia

You don’t need to run Qosium Scope in either of the measurement points. Instead, Scope can contact Probes anywhere, as long as there is connectivity between Scope and the primary Probe.

It is also possible to calculate some QoS statistics in a single-point measurement for a limited set of traffic types. However, this type of measurement has a few constraints, and requires more complex parameterization. For more information, see [How to Measure QoS with a Single Probe](#).